

REMARKS

Claims 1-34 were pending in the Application at the time of examination.

Claim 10 has been amended to incorporate the features of Claim 13 and Claim 25 has been amended to incorporate the features of Claim 30. Accordingly, Claims 13 and 30 has been canceled without prejudice. Claim 16 has been amended to be in independent form and to include the features of the base claim and any intervening claims.

The sections below are numbered to correspond with the section numbering used by the Examiner in the Office Action.

3/4. Claim 2 satisfies 35 U.S.C. 112, first paragraph.

With reference to Claim 2, the Examiner states:

There is no support in the written description for the first shield line and signal lines to be a part of a single conductor layer, the description indicates that it is the first and second shield lines that are a part of a single conductor (Office Action, Page 2, emphasis added).

The Examiner's statement is respectfully traversed. In reference to FIG. 3, Applicants' specification states:

In more detail, FIG. 3 is a top plan view of structure 100 which includes shield lines 102 and 104 positioned between but separated from signal lines 106, 108 and 108, 110, respectively. **Shield lines 102, 104 and signal lines 106, 108, 110 are all part of a single conductor layer.** This conductor layer can be any conductor layer, e.g. the conductor layer closest to the substrate or an interlayer conductor layer or even the top conductor layer. Structure 100 is a portion 112 of a larger substrate such as an integrated circuit. (Page 11 lines 23-33 emphasis added).

Further, in reference to FIG. 5, Applicants' specification states:

... FIG. 5 is a top plan view of a structure 200, in accordance with the present invention, which includes shield lines 202, 204 not requiring any allocation of area and signal lines 206, 208, 210, 212. **Shield lines 202, 204 and signal lines 206, 208, 210, 212 are all part of a single conductor layer.** This conductor layer can be any conductor layer, e.g. the conductor layer closest to the substrate or an interlayer conductor layer or even the uppermost conductor layer. (Page 16, Lines 9-18, emphasis added).

In light of the above, Applicants respectfully submit that Applicants' specification does in fact contain support for the first shield line and signal lines being a part of a single conductor layer.

Consequently, Applicants submit that the Examiner has not presented evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention that indicates that Applicants had possession of the invention as recited in Claim 2.

Accordingly, Claim 2 satisfies 35 U.S.C. 112, first paragraph.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

5/6. Claim 3 satisfies 35 U.S.C. 112, second paragraph.

The Examiner states:

... It is ambiguous as to how the shield lines "are each in a different conductor layer". The shield lines comprise a conducting layer; as such they are not "in a conductor layer". (Office Action, Pages 2-3.)

Applicants direct the Examiner's attention to FIGS. 3 and 4 and Page 14, Line 26 to Page 15, Line 23, which sets forth:

Although shielding of signal lines 106, 108, 110 from one another is discussed, **shield lines 102, 104 provide shielding in three dimensions** as discussed in greater detail in regards to FIG. 4. More particularly, **shield lines 102, 104 shield signal lines 106, 108, 110 from one another and from other signal lines of other conductor layers (e.g. from signal lines of underlying or overlying conductor layers).**

FIG. 4 is a cross-sectional view of the structure of FIG. 3 along the line IV-IV in accordance with one embodiment of the present invention. In accordance with this embodiment, FIG. 3 is a top plan view of the **conductor layer M2, e.g., the metal two layer**. Accordingly, **shield lines 102, 104 and signal line 108 in FIG. 4 are part of conductor layer M2**. Referring to FIG. 4, located below (above) shield line 102, signal line 108 and shield line 104 are signal line 106M1 (106M3), shield line 102M1 (102M3) and signal line 108M1 (108M3), respectively. **Signal lines 106M1 (106M3), 108M1 (108M3) and shield line 102M1 (102M3) are part of a conductor layer M1 (M3), e.g., the metal one (three) layer.**

In accordance with this embodiment, shield line 102 in combination with shield line 102M1 (102M3) shield signal line 108 from signal line 106M1 (106M3). Similarly, shield line 104 in combination with shield line 102M1 (102M3) shield signal line 108 from signal line 108M1 (108M3). **In this manner, shield lines 102, 104 shield signal line 108 from other signal lines on conductor layer M2 (e.g., shield lines 106, 110 of FIG. 3) and also from signal lines on underlying (overlying) conductor layer M1 (M3), e.g., from signal lines 106M1 (106M3), 108M1 (108M3).**

(Emphasis added).

Applicants respectfully submit that one of skill in the art would understand what is being claimed in Claim 3 when read in light of the specification. Accordingly, Claim 3 satisfies 35 U.S.C. 112, second paragraph.

GUNNISON, McKAY &
HODGSON, L.L.P.
Garden West Office Plaza, Suite 220
1900 Garden Road
Monterey, CA 93940
(831) 655-0880
Fax (831) 655-0888

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

7/8/9. Claims 1, 3-5, 7-10 and 15 are novel over Hiroshi (JP 4-313300).

The Examiner states:

Hiroshi (Fig 1) discloses a structure comprising a first (3) and a second signal line (3) above a substrate (2a) with a **first inherent shield line** (4; Abstract Constitution Lines 6-7) that is grounded and positioned between but separated from said first and second line (Abstract Purpose Line 2) in an unused substrate surface area, **said shielding line electrically floating** (via wire being in an electrical "zero" state due to grounding), ... (Office Action, page 3, emphasis added).

The Examiner admits that a "first inherent shield line" is "grounded". However, the Examiner continues in the statement to equate "electrically floating" with "being in an electrical 'zero' state due to grounding". Applicants submit however, those of skill in the art would recognize that electrically "grounding" a shield line and electrically "floating" a shield line are mutually exclusive and are indeed opposites. A grounded conductor is electrically coupled with a voltage source including, for example, earth ground at reference "zero" voltage. A floating conductor, on the other hand, is electrically isolated and not electrically coupled with a voltage source.

Applicants' specification states this understanding of electrically floating conductors:

In accordance with the present invention, a structure which includes first and second signal lines and a first shield line positioned between but separated from the first and second signal lines is presented. **The first shield line is electrically floating.**

GUNNISON, MCKAY &
HODGSON, L.L.P.
Garden West Office Plaza, Suite 220
1900 Garden Road
Monterey, CA 93940
(831) 655-0880
Fax (831) 655-0888

... Since the first shield line is electrically floating, electrical connections between the first shield line and a voltage source are not made. Thus, the routing program does not allocate any area for the various reference lines and vias which would otherwise be required to connect the first shield line to a voltage source as in the prior art. (Page 4, Line 34 to Page 5, Line 12, emphasis added).

Consequently, Applicants submit the **grounded** "first inherent shield line" of Hiroshi does not teach, and in fact teaches away from and the opposite of "said first shield line being electrically floating".

For the above reason, Hiroshi does not disclose, teach, or suggest:

A structure comprising:
a first signal line;
a second signal line; and
a first shield line positioned between but separated from said first signal line and said second signal line, said first shield line being electrically floating,

as recited in Claim 1, emphasis added.

Accordingly, Claim 1 is allowable over Hiroshi. Claims 3-5 and 7-9, which depend directly or indirectly from Claim 1, are allowable for at least the same reasons as Claim 1.

Amended Claim 10 is allowable over Hiroshi for reasons similar to Claim 1. Claim 15, which depends directly from Claim 10, is allowable for at least the same reasons as Claim 10.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

10/11. Claims 21, 22, and 24 are novel over Allen (U.S. Pat. No. 5,135,889).

The Examiner states:

Allen (Column 6, Lines 28-51) **discloses** forming a first and second signal line (Column 4, Lines 53-

GUNNISON, McKAY &
HODGSON, L.L.P.
Garden West Office Plaza, Suite 220
1900 Garden Road
Monterey, CA 93940
(831) 655-0880
Fax (831) 655-0888

54) above a substrate and forming a shield line positioned between but separated from said first and second signal line, and said first shield line being electrically floating ("grounded") and electrically connected to a second shield line (via grounded substrate; Column 3, Lines 56-57). (Office Action, page 4, emphasis added).

The Examiner's statement is respectfully traversed.

As set forth above in Sections 7/8/9, Applicants respectfully submit that an electrically "grounded" conductor is the opposite of an electrically "floating" conductor. A grounded conductor is electrically coupled with a voltage source including, for example, earth ground at reference "zero" voltage. A floating conductor, on the other hand, is electrically isolated and not electrically coupled with a voltage source.

FIG. 3A of Allen clearly shows "grounding traces 26" grounded, i.e., electrically coupled to grounded (GND) substrate 30.

In addition, at Column 6, Lines 28-38, Allen teaches:

A representative process sequence for the fabrication of the shielding structure 24 of the invention includes the steps of: ...

3. Patterning and etching the conducting material to form parallel spaced grounding traces 26 and tying the grounding traces 26 to a ground such as a grounded substrate 30. Alternatively, the grounding traces 26 may be connected to any power supply or source that acts as an AC short to ground.

(Emphasis added).

For the above reason, Allen does not disclose, teach, or suggest:

A method comprising:
forming a first signal line and a second signal line above a substrate;
forming a first shield line positioned between but separated from said first signal line and said

second signal line, said first shield line being electrically floating,

as recited in Claim 21, emphasis added.

Accordingly, Claim 21 is allowable over Allen. Claims 22 and 24, which depend directly from Claim 21, are allowable for at least the same reasons as Claim 21.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

12/13. Claims 25-27 and 31-34 are novel over Crowder (U.S. Pat. No. 5,446,243).

Rejection of cancelled Claim 30 is moot.

Claim 25, as amended, now recites the feature of:

said at least one shield line being electrically floating.

(Emphasis added).

In stark contrast Crowder teaches:

... As illustrated in FIGS. 3 and 4, conductors 202 (preferably a low resistance material such as copper or molybdenum) are placed in each of the unused wiring channels 108 and via channels 112. The conductors are electrically connected to one another so as to form a conductive mesh within the circuit board 100. This conductive mesh is tied to a reference voltage at a number of chip sites (not shown) by way of a terminating resistor 204 of 5 K ohms or less. (Column 3, Lines 22-31, emphasis added).

Also, with reference to FIG. 5., Crowder teaches:

... As will be observed, X, Y signals lines and vias are surrounded by a conductive mesh 504 formed by conductors which have been placed in otherwise unused wiring and via channels. Preferably, to the extent possible, every empty wiring and via channel is filled with a conductor and tied into the conductive mesh. Again, the conductive mesh is tied

to a reference voltage (Column 3, Lines 40-46,
emphasis added.)

Applicants submit that Crowder teaches the "grounding" of the conductive mesh, i.e., the opposite of the "electrically floating" shield line recited in amended Claim 25.

Accordingly, amended Claim 25 is allowable over Crowder. Claims 26 and 31-34, which depend directly or indirectly from amended Claim 25, are allowable for at least the same reasons as Claim 25.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

16/17/18/19/20. Claims 11, 12, 14, and 17-20 are patentable over Hiroshi in view of the Examiner's statements.

Rejection of cancelled Claim 13 is moot.

As set forth above in Section 7/8/9, Claim 10 is patentable, as amended, over Hiroshi. None of the Examiner's statements on page 6, sections 17-20 of the Office Action cures the deficiencies noted in Hiroshi. Accordingly, Claim 10 is patentable over Hiroshi in view of the various statements of the Examiner.

Claims 11, 12, 14, and 17-20 depend directly or indirectly from Claim 10. Consequently, Claims 11, 12, 14, and 17-20 are patentable over Hiroshi in view of the Examiner's statements for at least the same reasons as Claim 10.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

21/22. Claims 28 and 29 are patentable over Crowder as applied to Claim 26 in view of the Examiner's statements.

As set forth above in Section 12/13, Claim 26 is allowable over Crowder. The Examiner's statements on page 7, section 22 of the Office Action does not cure the deficiencies noted in Crowder. Accordingly, Claim 26 is allowable over Crowder in view of the Examiner's statements.

Claims 28 and 29 depend directly from Claim 26. Accordingly, Claims 28 and 29 are patentable over Crowder, as applied to Claim 26, in view of the Examiner's statements for at least the same reasons as Claim 26.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this rejection.

23. Allowable Subject Matter

As set forth above, Claims 1 and 21 are allowable. Claims 6 and 23, as filed, depend indirectly from Claims 1 and 21 respectively.

Accordingly, Applicants submit that Claims 6 and 23, as filed, are based on allowable base claims and are therefore allowable for at least the same reasons as their respective base claims.

Claim 16 has been amended to be in independent form and to include the features of the base claim and any intervening claims. Accordingly, Claim 16 is allowable.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of this objection.

CONCLUSION

Claims 1-12, 14-29, and 31-34 are pending in the application. For the foregoing reasons, Applicants respectfully request allowance of all pending claims. If the Examiner has any questions relating to the above, the Examiner is respectfully requested to telephone the undersigned Attorney for Applicants.

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on July 18, 2002.

Serge J. Hodgson
Attorney for Applicants

July 18, 2002
Date of Signature

Respectfully submitted,

Serge J. Hodgson
Serge J. Hodgson
Attorney for Applicants
Reg. No. 40,017
(831) 655-0880 Ext. 12

GUNNISON, MCKAY &
HODGSON, L.L.P.
Garden West Office Plaza, Suite 220
1900 Garden Road
Monterey, CA 93940
(831) 655-0880
Fax (831) 655-0888

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Applicants: Daniel G. Schweikert, John F. MacDonald
Assignee: Sun Microsystems, Inc.
Title: METAL REGION FOR REDUCTION OF CAPACITIVE COUPLING
BETWEEN SIGNAL LINES
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 13 and 30 have been cancelled without prejudice.

Claims 10, 16, and 25 have been amended as follows:

10. (AMENDED) A structure comprising:
a substrate;
a first signal line above said substrate;
a second signal line above said substrate, wherein unused
substrate surface area exists between said first signal line
and said second signal line; and
a first shield line in said unused substrate surface area,
said first shield line being electrically floating.

16. (AMENDED) [The structure of Claim 15] A structure comprising:

a substrate;

a first signal line above said substrate;

a second signal line above said substrate, wherein unused substrate surface area exists between said first signal line and said second signal line;

a first shield line in said unused substrate surface area and;

a second shield line electrically connected to said first shield line, wherein said first shield line and said second shield line are part of a single conductor layer.

25. (AMENDED) A method comprising:

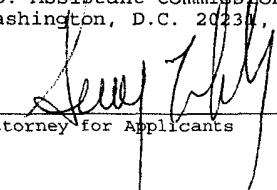
defining a signal line layout comprising a plurality of signal lines;

defining any area of said signal line layout which is not one of said plurality of signal lines as unused area; and

defining at least one shield line in said unused area,
said at least one shield line being electrically floating.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on July 18, 2002.



Attorney for Applicants

July 18, 2002

Date of Signature